

Remarks

The Office Action mailed November 2, 2004 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1 and 3-20 are now pending in this application. Claims 1, 3, 4, 6-9, 11, and 13-20 stand rejected. Claims 2, 5, and 12 are objected to. Claim 2 has been canceled. Claim 10 is allowed. Claim 10 is an independent claim from which Claims 11-14 depend.

In the Office Action Summary, Claims 11, 13, and 14 are indicated as being rejected and Claim 12 is indicated as objected to. Applicant believes the Office Action Summary includes typographical errors as rejections for Claims 11, 13, and 14 are not addressed in the Office Action. In addition, Claim 12 depends from Claim 10 which has been indicated as allowable. As such, Applicant believes the objection to Claim 12 is also in error, and submits that Claims 11-14 are allowable.

The objections to the drawings are respectfully traversed. A drawing change for Figure 7, including an annotated sheet and a replacement sheet, is submitted herewith. In addition, the specification has been amended to address issues noted in the Office Action relating to the reference numerals used in the drawings. For the reasons set forth above, Applicant requests that the objections to the drawings be withdrawn.

The rejection of Claims 1 and 18 under 35 U.S.C. § 102(b) as being anticipated by Saitoh et al. (U.S. Patent No. 4,491,976) is respectfully traversed.

Claim 1 has been amended to incorporate the limitation of Claim 2 which has been indicated as being allowable.

Saitoh et al. describe a circuit for controlling the first local oscillation of a tuner by a phase locked loop (PLL) circuit. Referring to Column 12, lines 1-57, the circuit includes a

frequency combiner 64, a third mixer 65, a low-pass filter 66, a variable frequency divider 67, a program switch 68, a phase detector 69, a reference oscillator 70, and a low-pass filter 71.

The outputs of the first local oscillator 6 and the second local oscillator 10 are supplied to the frequency combiner 64 which comprises a directional coupler, a band-pass filter and a low-pass filter to prevent the oscillation signals and spurious signal components derived from the oscillation signals from coming back to the first and second local oscillators 6 and 10, and the difference between the two oscillators is taken out of the third mixer 65 through a low-pass filter 66, and a frequency division ratio is determined by the program switch 68 and the difference frequency is divided by the variable frequency divider 67 in accordance with the selected ratio. The divided signal is compared with the oscillation signal of the reference oscillator 70 by the phase detector 69 which produces an output representing a difference of the phases, which is then integrated by the low-pass filter 71 to produce a D.C. voltage, which in turn is supplied to the first local oscillator 6 to control its output frequency.

Claim 18 recites a frequency conversion method, for shifting the frequency of an input signal by a desired frequency, comprising the steps of “mixing said first signal and said second signal to produce a difference signal” and “comparing said difference signal with a pulse train signal, said pulse train signal having a harmonic corresponding to the desired frequency, producing, through aliasing, a low frequency error signal corresponding to the difference between said difference signal and the harmonic of said pulse train signal”.

Saitoh et al. do not describe nor suggest comparing a difference signal with a pulse train signal that has a harmonic corresponding to the desired frequency. Nor do Saitoh et al. produce, through aliasing, a low frequency error signal corresponding to the difference between the difference signal and the harmonic of the pulse train signal. Rather, Saitoh et al. describe a divided signal that is compared with the oscillation signal of a reference oscillator by the phase detector which produces an output representing a difference of the phases. Further Saitoh et al. describe integrating the output with a low-pass filter to produce a D.C. voltage which is utilized

to control an output frequency of the first local oscillator. Comparing a difference signal with a pulse train or using a low frequency error signal to control an oscillator are neither described nor suggested.

For the reasons set forth above, Claim 18 is submitted to be patentable over Saitoh et al.

For the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claims 1 and 18 be withdrawn.

The rejections of Claims 3, 4, and 6-9 under 35 U.S.C. § 103 are respectfully traversed. Claims 3, 4, 6-9 all depend from independent Claim 1 which, as amended, is indicated as being patentable over the cited art. For these reasons, Claim 3, 4, and 6-9 are submitted to be patentable.

The rejection of Claims 15 and 16 under 35 U.S.C. § 103 as being unpatentable over Saitoh et al. in view of Stott et al. (U.S. Patent No. 6,320,915) and further in view of Bjerede et al. (U.S. Patent No. 5,648,985) is respectfully traversed.

Saitoh et al. is described above. Stott et al. describe synchronization of Orthogonal Frequency Division Multiplex (OFDM) signals, such as may be used for broadcasting digital television signals in the uhf (ultra high frequency) bands, or for digital audio broadcasting (DAB). The described OFDM signal consists of data signals and reference information modulated as QPSK or quadrature amplitude modulation on to several thousand individual carriers, evenly spaced in frequency and occupying a total bandwidth of several Megahertz in the uhf spectrum.

Bjerede et al. describe an RF integrated circuit chip for processing the input signal provided by the IF chip at the intermediate frequency to up convert the frequency thereof to a transmission frequency and for processing a received signal provided at the reception frequency to down convert the frequency thereof to the intermediate frequency. Column 1, lines 52-58.

Claim 15 recites a transmitter for transmitting orthogonal frequency division modulated (OFDM) signals, comprising an OFDM transmission engine, an intermediate frequency converter, and an RF frequency upconverter. The upconverter includes “a converter for shifting the frequency of the IF signal by an amount corresponding to the frequency difference of the signals from the pair of frequency synthesizers,” “a reference signal generator for generating, based on the external reference signal, an internal reference signal having a harmonic at a frequency corresponding to the desired frequency” and “a sampler for sampling a frequency difference signal corresponding to the frequency difference of the signals from the pair of frequency synthesizers with the internal reference signal to produce an error signal corresponding to the difference between the frequency difference signal and the desired frequency”.

Saitoh et al. in view of Stott et al. and further in view of Bjerede et al. do not describe, nor suggest, a transmitter which includes a reference signal generator for generating an internal reference signal having a harmonic at a frequency based on the external reference signal. Nor is a sampler for sampling a frequency difference signal against the internal reference signal to produce an error signal corresponding to the difference between the frequency difference signal and the desired frequency described or suggested. Rather, Saitoh et al. describe integrating the output with a low-pass filter to produce a D.C. voltage which is utilized to control an output frequency of a local oscillator, Stott et al. describe synchronization of OFDM signals, and Bjerede et al. describe an RF integrated circuit chip for upconverting an IF frequency to a transmission frequency.

For the reasons set forth above, Claim 15 is submitted to be patentable over Saitoh et al. in view of Stott et al. and further in view of Bjerede et al.

Claim 16 depends from independent Claim 15. When the recitations of Claim 16 are considered in combination with the recitations of Claim 15, Applicant submits that dependent Claim 16 likewise is patentable over Saitoh et al. in view of Stott et al. and further in view of

Bjerede et al., and therefore respectfully request that the Section 103 rejection of Claims 15 and 16 be withdrawn.

The rejection of Claim 17 under 35 U.S.C. § 103 as being unpatentable over Saitoh et al. in view of Stott et al. and further in view of Hindman et al. (U.S. Patent No. 5,648,985) is respectfully traversed.

Saitoh et al. and Stott et al. are described above. Hindman et al. describe a local oscillator 150 that includes a direct digital synthesizer, DDS, for generating a smooth analog sine wave to avoid generation of harmonics in the mixing process. The DDS is driven by a system clock 50.

Claim 17 depends from Claim 15 which recites a transmitter for transmitting orthogonal frequency division modulated (OFDM) signals, comprising an OFDM transmission engine, an intermediate frequency converter, and an RF frequency upconverter. The upconverter includes “a converter for shifting the frequency of the IF signal by an amount corresponding to the frequency difference of the signals from the pair of frequency synthesizers,” “a reference signal generator for generating, based on the external reference signal, an internal reference signal having a harmonic at a frequency corresponding to the desired frequency” and “a sampler for sampling a frequency difference signal corresponding to the frequency difference of the signals from the pair of frequency synthesizers with the internal reference signal to produce an error signal corresponding to the difference between the frequency difference signal and the desired frequency”.

Saitoh et al. in view of Stott et al. and further in view of Hindman et al. do not describe, nor suggest, a transmitter which includes a reference signal generator for generating an internal reference signal having a harmonic at a frequency based on the external reference signal. Nor is a sampler for sampling a frequency difference signal against the internal reference signal to produce an error signal corresponding to the difference between the frequency difference signal and the desired frequency described or suggested. Rather, Saitoh et al. describe integrating the

output with a low-pass filter to produce a D.C. voltage which is utilized to control an output frequency of a local oscillator, Stott et al. describe synchronization of OFDM signals, and Hindman et al. describe a direct digital synthesizer which avoids generation of harmonics in the mixing process.

For the reasons set forth above, Claim 15 is submitted to be patentable over Saitoh et al. in view of Stott et al. and further in view of Hindman et al.

Claim 17 depends from independent Claim 15. When the recitations of Claim 17 are considered in combination with the recitations of Claim 15, Applicant submits that dependent Claim 17 likewise is patentable over Saitoh et al. in view of Stott et al. and further in view of Hindman et al., and therefore respectfully request that the Section 103 rejection of Claim 17 be withdrawn.

The rejection of Claim 19 under 35 U.S.C. § 103 as being unpatentable over Saitoh et al. in view of Hindman et al. is respectfully traversed.

Saitoh et al. and Hindman et al. are described above. Claim 19 depends from Claim 18 which recites a frequency conversion method, for shifting the frequency of an input signal by a desired frequency, comprising the steps of “mixing said first signal and said second signal to produce a difference signal” and “comparing said difference signal with a pulse train signal, said pulse train signal having a harmonic corresponding to the desired frequency, producing, through aliasing, a low frequency error signal corresponding to the difference between said difference signal and the harmonic of said pulse train signal”.

Saitoh et al. in view of Hindman et al. do not describe nor suggest comparing a difference signal with a pulse train signal that has a harmonic corresponding to the desired frequency. Nor do Saitoh et al. produce, through aliasing, a low frequency error signal corresponding to the difference between the difference signal and the harmonic of the pulse train signal. Rather, Saitoh et al. describe a divided signal that is compared with the oscillation signal of a reference

oscillator by the phase detector which produces an output representing a difference of the phases. Hindman et al. describe a direct digital synthesizer which avoids generation of harmonics in the mixing process. Further Saitoh et al. describe integrating the output with a low-pass filter to produce a D.C. voltage which is utilized to control an output frequency of the first local oscillator. Comparing a difference signal with a pulse train or using a low frequency error signal to control an oscillator are neither described nor suggested. For the reasons set forth above, Claim 18 is submitted to be patentable over Saitoh et al. in view of Hindman et al.

Claim 19 depends from independent Claim 18. When the recitations of Claim 19 are considered in combination with the recitations of Claim 18, Applicant submits that dependent Claim 19 likewise is patentable over Saitoh et al. in view of Hindman et al., and therefore respectfully request that the Section 103 rejection of Claim 19 be withdrawn.

Applicant respectfully submits that the Section 103 rejection of the presently pending claims is not a proper rejection. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Saitoh et al., Stott et al., Bjerde et al., or Hindman et al. considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicant respectfully submits that it would not be obvious to one skilled in the art to combine Frankel et al. and Saitoh et al., Stott et al., Bjerde et al., and Hindman et al. in the various cited combinations because there is no motivation to combine the references suggested in the art. Additionally, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicant's own teaching. Rather, only the conclusory statement that it would have been obvious to one of ordinary skill in the art at the time the invention was made" or "one of ordinary skill in the art would have been motivated to this" suggests the cited combination of Saitoh et al., Stott et al., Bjerde et al., and Hindman et al. However, the circuit described by Saitoh et al. utilizes a DC voltage to control a frequency of an oscillator, and combining Saitoh et al. with any of Stott et al., Bjerde et al., and Hindman et al. would require a

significant change to the operation of the system described by each of Stott et al., Bjerede et al., and Hindman et al.

Further, the only suggestion to combine Saitoh et al. with the variously cited combinations of Stott et al., Bjerede et al., and Hindman et al. is a conclusory statement along the lines of, “[a]t the time the invention was made, it would have been obvious to one of ordinary skill in the art to ...” However, the system of Saitoh et al. explicitly describe generation of a D.C. signal to control a frequency of an oscillator and not the generation of an internal reference signal having a harmonic at a frequency corresponding to a desired frequency. Furthermore, Stott et al. describe OFDM synchronization, Bjerede et al. describe up-converting of signals to an RF frequency, and Hindman et al. describe direct digital synthesis. Accordingly, there appears to be no motivation to combine the cited references that is found either within the references themselves nor in the skill in the art at the time the invention was made.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicant's disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such

reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Saitoh et al. are cited for their teaching of generating a signal for frequency control of an oscillator, Stott et al. are cited for their teaching of synchronization of OFDM signals and conversion of received signals to an intermediate frequency, Bjerde et al. are merely cited for their teaching of up-converting of signals to an RF transmission frequency, and Hindmann et al. is cited for teaching a local oscillator that includes a direct digital synthesis circuit. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejections appear to be based on hindsight reconstructions in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason, in addition to the reasons set forth above, Applicant requests that the Section 103 rejections be withdrawn.

In addition, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Saitoh et al., Stott et al., Bjerde et al., nor Hindman et al., considered alone or in combination, describe or suggest, for example, a generator for generating an internal reference signal, based on an external reference signal, having a harmonic at a frequency corresponding to a desired frequency and utilizing the generated internal reference signal to produce an error signal.

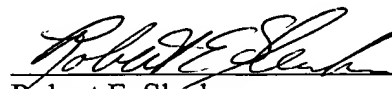
If art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. Moreover, Applicant respectfully submits that Saitoh et al., Stott et al., Bjerde et al., and Hindman et al., teach away from the present invention, and as such, there is no suggestion or motivation to combine Saitoh et al., Stott et al., Bjerde et al., and Hindman et al. in the variously cited combinations to produce the claimed invention. Specifically, in contrast to the

present invention, Saitoh et al. describes a system in which a D.C. voltage is generated to control the frequency of an oscillator, and in further contrast to Saitoh et al. and to the present invention, Stott et al. describe a system which synchronizes OFDM signals and converts received signals to an intermediate frequency. Bjerede et al. teaches up-converting of signals to an RF transmission frequency and Hindmann et al. teaches a local oscillator that includes a direct digital synthesis circuit. Accordingly, and to the extent understood, no combination of Saitoh et al., Stott et al., Bjerede et al., and Hindman et al. describe or suggest the claimed invention and Applicant requests that the Section 103 rejections be withdrawn.

The objection to Claims 2, 5, and 12 is respectfully traversed. Claims 2, 5, and 12 were objected to as being dependent upon a rejected base claim, and were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 2 has been canceled and Claim 1 has been amended to include the recitations from Claim 2, and as such, Claim 1 is submitted to be in condition for allowance. Claim 5 depends from Claim 1, and as such is likewise submitted to be in condition for allowance. Claim 12 depends from independent Claim 10 which has been indicated as being allowed. Accordingly, Claim 12 is submitted to be in condition for allowance.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,


Robert E. Slenker
Registration No. 45,112
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070

IN THE DRAWINGS

Applicant respectfully requests approval of the following drawing change. Specifically, Figure 7 has been amended to correctly indicate reference numerals 220 and 222 as utilized in the specification. Applicant submits replacement drawing sheets incorporating the change to Figure 7. Also submitted herewith is an annotated Figure 7, reflecting the requested changes in red ink. No new matter has been added to the application.

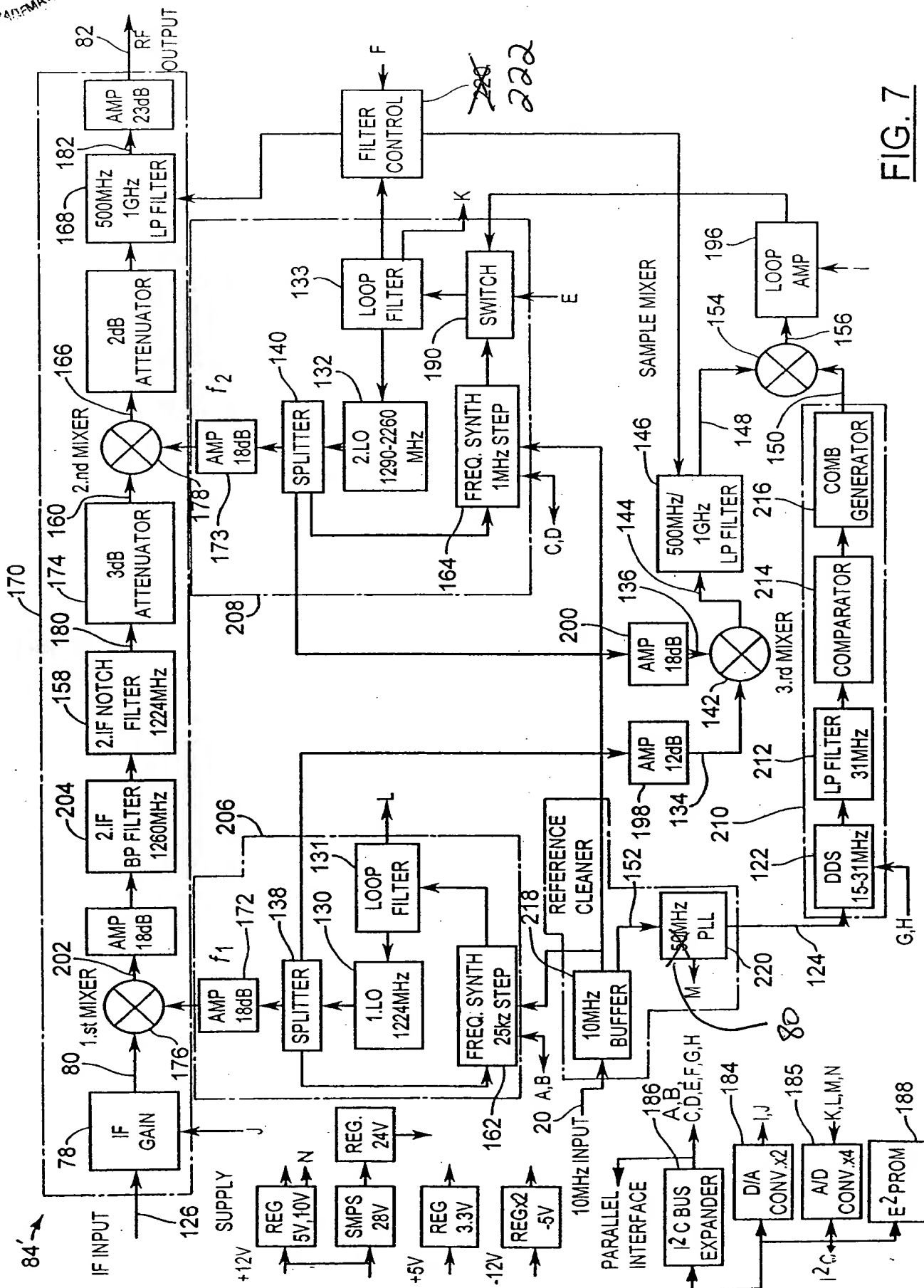


FIG. 7